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ON A SERIES OF CASES OF CANCER OF THE
TONGUE.

By STANLEY BOYD, M.B., F.R.C.S.,

Surgeon to the Charing Cross Hospital, and to the Hospital for Consumption and
- Diseases of the Chest; and

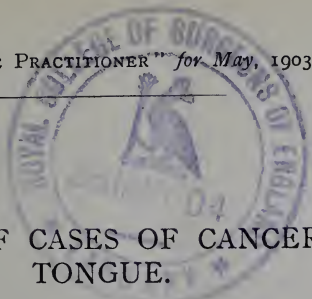
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FOR the purposes of this paper we have collected the cases which one of us has had in hospital and private practice during the 12 years 1891-1902 inclusive, and have thrown them into the form of a table, upon which our remarks are based. We believe that every case in which the tongue was apparently the primary and chief seat of the disease has been included. The notes are often imperfect, occasionally, perhaps, incorrect ; but a good deal of trouble has been expended upon them by the surgeon, who often alone knows the state of matters and exactly what has been done. No one who studies the table will think that the cases recorded in it have been selected with an eye to statistics : the conclusion will probably be that more cases should have been rejected. As a matter of fact, operation has been refused to very few.

When we started upon this investigation we certainly hoped for results less disappointing than we have found. It was time to consider the cases carefully, and to endeavour to improve upon the past.

We have 34 cases, in 27 of which some part of the tongue other than the frænum was the primary seat of the disease ; in 7 the frænum seemed to be first affected. Taking first the *Tongue-cases* (27) we find that the first (No. 1) was recurrent after operation at Guy's Hospital. No microscopic examination is recorded ; if the growth was an epithelioma, the course of the case was unusual. The man has not been traced, so the case is of no value and will not be reckoned.

The remaining 26 cases were all primary when they came under treatment.

TABLE.—

No.	Name. Sex.	Age.	Duration.	Condition on Admission.		
				General.	Local.	Glands.
1 1891.	Haines. M.	66	Wart 26 years. Infiltration began 8 years, removed 6 years ago. Slow recurrence at once.	?	Hardish nodular growth, not ulcerated at left end of tongue-scar: not infil- trating floor, nor tongue deeply.	?
2 1892.	George. F.	45	10 weeks.	Good: "flesh lost rapidly lately."	Ulcer, size of shilling, on left edge: apparently anterior and not infil- trating much.	Small one felt at angle of jaw.
3 1893, Feb. 4.	Powell. M.	48	3 months.	?	Ulcer beneath right edge, in molar region, infiltra- ting tongue deeply and fixing it.	One right upper carotid.
4 1893, Sept. 30.	Hatton. F.	61	Leucoplakia 14 years. Ulcer 4 months. Growth on alveolus 6 weeks. No history of syphilis.	Good.	Leucoplakia and bald patches over anterior two- thirds. Tongue - surface very irregular. Ulcer, size of shilling, on right dorsum in front, infil- trating deeply and fixing tongue. Warty growth on 1½-in. of toothless lower alveolus and on floor of mouth for same distance behind sym- physis.	Right submaxillary probably enlarged.
5 1894, Apr. 26.	Hart. M.	47	14 days.	?	Ulcer, size of shilling, right side, ½ in. from tip, extending to floor and fixing tongue. Dorsum healthy.	?
6 1894, July 7.	Murphy. M.	54	2 months. Cauterised several times.	?	Oval ulcer, 1 in. long on right edge, opposite site of wisdom tooth and on anterior pillar: indura- tion two-thirds across tongue.	Both submaxillary felt.
7. 1894, Oct. 13.	Spicer. M.	53	For 10-11 months broken molar irri- tated tongue. 3 weeks pain and swelling. Tongue sore on and off for 10 years.	Good.	1 in. ulcer from opposite right molars to ½ in. from tip; not reaching mid- line. Tongue well pro- truded.	One right sub- maxillary. [Those removed were not diseased (microsc.)].
1895, Oct. 19.	—	54	Swelling at right angle 1 week; dis- comfort longer.	Better; flesh gained since operation.	Tongue normal. Swelling felt — not seen — below right angle of jaw.	—
1896, Mar. 28.	—	55	Less than 3 months.	?	Large mass behind right angle of jaw and some smaller ones.	—
8. 1894.	Bagster. M.	54	2 months.	Stout, alcoholic: cirrhosis of liver.	On right edge in front of anterior pillar an ulcer ¾ in. by ½ in., with filbert mass in tongue. Freely movable.	Right submaxillary suspicious.

TONGUE CASES.

Operation.	Recurrences.	Result.
Removed freely with scissors - - - - -	—	Not traced.
Removed freely: sutured; gland not touched -	—	March 1903 (11 years). Strong and very healthy. No trouble with tongue.
Small submaxillary and 2 large upper carotid glands removed. Ulcer removed by cutting from one-third back on right edge nearly to mid-line and nearly to epiglottis. Access was unsatisfactory.	Recurred - - - - -	Died of recurrence (site unknown) in 6 months.
Submaxillary lymphatic glands on both sides, and one submental removed through curved cuts starting below angles and meeting below symphysis. Lower lip and chin divided, flaps turned back to masseters, central 3 in. of jaw removed with floor of mouth and anterior half of tongue. Cut ends of bone fixed apart by two stout silver-wire spanners.	Recurred in 6 weeks on right side of tongue: more removed. Soon after this both right and left upper carotid glands swelled. Nothing more done.	The wire spanners healed in, and a photograph shows a good chin. But lower lip was drawn behind upper by scar-contraction.
Large and several small right submaxillary glands removed, with salivary. Mucoperiosteum elevated opposite ulcer. Tongue divided along centre and cut through on right behind ulcer.	7 months later: recurrence <i>in loco</i> , in right submaxillary region (ulcerating), and left submaxillary and cervical glands.	Too extensive for treatment.
Right Kocher's cut: submental, submaxillary, and 2 upper carotid glands. Right half of tongue removed back to hyoid through submaxillary wound. Some of left base, the right tonsil and part of right soft palate removed also.	1 month later: rapidly growing epithelioma on edge of wound in palate. Wide removal.	Inoperable recurrence noted on return from convalescent home. No note.
Submaxillary glands (not the salivary) removed, "with all connective tissue." Upper carotid glands not "felt"; left. Ulcer removed with scissors. Good margin.	Recurrence 1 year later. See below.	—
$\frac{1}{2}$ in. cut on to anterior edge of sternomastoid. Mass of glands, $1\frac{1}{2}$ in. by 1 in. by $\frac{1}{2}$ in., removed from beneath parotid and sternomastoid, one chief gland containing epithelial foci (microsc.). 3 or 4 quite small glands near removed.	Recurrence 6 months later. See below.	—
$\frac{1}{2}$ in. cut on to sternomastoid. Mass removed adherent to carotid sheath and posterior belly of digastric and sternomastoid. Portions of the jugular, common, internal and external carotids removed with it.	Recurred. In 2 months there was an epithelioma at <i>left</i> base of tongue and left upper carotid glands were swollen.	Died Dec. 1896, 9 months from last operation.
Submaxillary and upper carotid glands removed. Right half of tongue removed with lower end of anterior pillar.	—	Died nearly 6 years later of uræmia and hæmorrhage from the stomach

No.	Name. Sex.	Age.	Duration.	Condition on Admission.		
				General.	Local.	Glands.
9. 1895.	Skinner. M.	75	7 weeks.	Feeble.	Leucoplakia, warty mass, "size of 2 walnuts" on right edge, dorsum and under surface. Covers 2 in. back from tip. Little induration.	A right submaxillary felt.
10. 1895, Jan.	Haslam. M.	55	2 months.	Healthy.	"Considerable" ulcer on under surface of right half, not involving floor or free edge, not crossing midline. Infiltration moderate, movement not impaired. Irritated area across frænum.	2 or 3 submaxillary, mobile, hard.
1900, May.	—	59	6 weeks. Soreness and roughness of tongue; 2 teeth drawn; no good.	—	Right edge, except tip, adherent to floor; normal. Superficial epithelioma of left side, floor and gum, 1 in. from before back.	Left submaxillary hard and swollen, on right none.
1901, Feb.	—	—	1 month. Soreness.	—	Small swelling in front of coronoid process close to where V of bone was excised. In floor of mouth opposite this an ulcer 1 in. by $\frac{1}{2}$ in. indurated. Tongue free.	No glands.
11 1895, Mar.	Nicol. M.	58	3 months. Bitten on tongue by parrot at site of ulcer 6 months ago.	?	Ulcer size of shilling on left edge and dorsum in middle third to $\frac{1}{2}$ in. from midline. Moderate infiltration; mobility good.	One left submaxillary. and one upper carotid.
May	—	—	—	—	Hard, slightly adherent gland at angle of jaw—slight prominence.	
1896, Feb.	—	60	—	Very ill.	Tongue swollen, hard and fixed. Ulcer on left extending across mid-line, and far back.	Numerous in all parts of neck: most on left. Liver 3 in. below ribs.
12 1897.	Coulson.	57	3 months' pain.	Fair. P. 116-124. Cause? Temperature normal.	In tongue opposite right tonsil and anterior pillar a mass less than pigeon's egg; mirror showed no ulceration. Anterior pillar involved below. Growth not fixed.	Fulness about right angle of jaw, one submaxillary gland felt and deep to jaw a nearly fixed mass. A gland (chestnut) opposite cricoid.
13 1897, May.	Walker. M.	52	11 weeks. Flesh lost 7 weeks.	Good.	Bossy mass, in anterior part of tongue chiefly on right. It crosses midline and is $1\frac{1}{2}$ in. from before back. Little ulceration. No note of mobility or state of floor.	No glands distinctly felt; probably some on right.
July	—	—	—	—	Hard, filbert-sized gland in left upper carotid region, just where first operation stopped.	—

Operation.	Recurrences.	Result.
Cocaine. Right half removed with scissors to behind growth. Wound sewn up.	—	Died $4\frac{1}{2}$ years later of bronchitis and emphysema.
3 submental and 3 submaxillary removed. None felt posterior to submaxillary salivary gland. 4 teeth drawn. Mucosa elevated from jaw opposite ulcer. Ulcer removed with scissors; also "irritated" mucosa across frænum. Good margin.	Recurrence or fresh growth? See below.	Remained free for over 5 years.
Left Kocher's cut. Thorough clearance to upper carotid region. Removal of growth on tongue, floor of mouth, and sublingual gland (infiltrated), and gum with all bone subjacent—a bar being left below— <i>after reflection of cheek</i> .	Recurrence in 8 months. See below.	—
Lip cut through in old scar, jaw sawn in mid-line. Tongue cut $\frac{1}{4}$ in. from left edge and $\frac{1}{2}$ in. from ulcer to well behind it. Alveolar process cut away to behind growth $\frac{1}{2}$ in. above lower border, and all growth removed with a good deal of tongue-muscle.	—	March, 1903 (2 years). "I am in good health, and my mouth is all right, so far as I know."
Left submaxillary region cleared and gland at angle of jaw removed. Lingual tied. Tongue split down middle, and left half removed wide of growth.	At angle of jaw 2 months later: see below.	
3-in. cut on to sternomastoid edge. Gland felt lay deep to parotid opposite transverse process of atlas. Removed with one smaller and higher and several lower along vein. Latter seemed sound.	In tongue and glands 8 months later: see below.	
—	—	Inoperable recurrence.
5-6 in. cut along right sternomastoid; another, forwards above hyoid. Fat and glands removed along great vessels from beneath digastric almost to clavicle; also back some way into post-triangle. Big gland lay outside jugular and burst in removal. Submaxillary region cleared. Lingual tied. Right half of tongue removed through mouth fairly completely. Dyspnoea early necessitated laryngotomy. Neck-wound gauze-drained. Tube retained till 5th.	—	Death on 5th from septicæmia? Slight jaundice on 3rd, delirious on 4th night, temperature 100-102, pulse 118-132, respiration, normal, P.M. neck-wound communicated with mouth, right vagus surrounded by pus, œsophagus full of pus, internal jugular thrombosed for $\frac{3}{4}$ in. opposite common facial vein.
Double Kocher. Right lingual tied. Submaxillary wounds closed. Growth removed through mouth from behind left tip obliquely backwards and to right. Right sublingual gland removed. Good margin in all directions.	In 2 months in left upper carotid region, see below.	—
Incision along whole length of sternomastoid; gland felt adhered to sheath of jugular, common facial, and digastric; was dissected off, apparently cleanly. Glands and connective tissue removed from behind whole length of jugular and back into post-triangle.	In 4 months in right neck and slight in left, see below.	—

No.	Name. Sex.	Age.	Duration.	Condition on Admission.		
				General.	Local.	Glands.
13— <i>cont.</i> 1897, Nov.	—	—	—	Good	Tongue free. Rather fixed mass beneath right sub-maxillary flap. Smaller mass opposite thyrohyoid space, probably fixed to carotid sheath. On left, indefinite hard mass about site of main gland dissected off in July.	—
14 1897, Aug.	Browning. M.	52	6 weeks ulcer. Syphilis 20 years ago; tongue sore 18 years ago; caustics: more or less trouble since.	Good.	Tongue covered with leucoplakial and bare patches. Ulcer, the size of sixpence, on right dorsum, $\frac{3}{4}$ in. from tip from mid-line to edge, which is "glossy."	One right sub-maxillary enlarged; another, left, smaller; others small, hard, at left angle of jaw.
1898, June	—	—	5 weeks, mobile lump. 2 weeks, got fixed and grew last. Much pain.	Good.	Hard walnut mass adherent to right jaw, reaching down to hyoid and up to floor of mouth (mucosa free), 2 or 3 small upper carotid glands.	—
15 1898, Jan	Chave. M.	52	5 months, tooth chafed tongue. Syphilis 31 years ago. Tongue sore in first year, not since. 1 month's anti-syphilitic treatment useless.	Good.	On left edge near tip a bald red patch, then an epithelial thickening, culminating posteriorly in a small hard-edged ulcer—a long oval, 1 in. altogether surrounded by leucoplakial ring.	No glands.
1902, Nov.	—	57	Five weeks' pain 3 weeks' rapid swelling.	Good.	1½ by 2 in. swelling, very tender, adherent to left sternomastoid just above clavicle. Temperature, 99°-100°. Fluctuation under anæsthesia.	—
16 1898, June.	Banks. M.	42	Six months' "sore throat."	Good, 13 lbs. lost.	Swelling of extreme back of visible tongue, more on right than on left. Base indurated from side to side; an ulcer in midline can just be felt and can be seen with laryngoscope. Cords concealed by contact of swollen base and epiglottis with spine.	A long swelling along vessels behind left angle of jaw. Obscure swelling opposite right great cornu.

Operation.	Recurrences.	Result.
Old right submaxillary flap raised; mass adherent to anterior belly of digastric removed; revealing deeper mass in wall of pharynx adherent to great cornu. Incompletely removed. Many enlarged glands beneath right sternomastoid, but no justification for trying to remove them.	—	Inoperable recurrence. Recovery and healing always rapid. Condition excellent at end.
Ulcer removed with scissors, wound closed. Extravasation into tongue and floor; much pain. No gland-operation done.	10 months in right submaxillary region.	—
Large Kocher flaps. Removal of large softening gland mass, with whole of salivary gland, anterior and part of posterior belly of digastric, most of mylohyoid, anterior fibres of masseter, and a good layer of deep surface and free edge of jaw bared by removal of mass. Several slightly enlarged glands along spinal accessory removed.	Soon after discharge recurrence began. In 4 months (October 1898), a mass adherent to right jaw and numerous glands in right neck.	Inoperable recurrence.
A thorough left Kocher. Lingual tied. About the left third of visible dorsum removed, including oval patch and all leucoplakia.	This patient was seen frequently. In December 1899, he and I thought a slight nodule in left submaxillary region had increased. Removed; only a deep bit of submaxillary salivary gland. In October 1901 leucoplakial patch near tongue scar; thick, tending to ulcerate. Removed, not epithelioma (microsc.). In July 1902 a submental gland, 4 months enlarged, was removed. No cancer found microscopically. In October 1902 recurred in left lower carotid gland.	—
Needle drew off 5 dr. turbid fluid showing only leucocytes. Incision, curetting, solid wall removed, proved to be epitheliomatous. Two weeks later whole mass removed with good length of sternomastoid and of jugular; difficult, but growth was well surrounded by apparently healthy tissues.	Sinus remained with free watery irritating discharge. Board-like induration spread around. Flesh and strength lost rapidly. In January 1903 a gland-swelling appeared on right. Rest of neck apparently sound.	Inoperable recurrence low in neck 4½ years after removal of primary growth.
Breathing stopped as anaesthesia deepened, tongue-traction useless, tracheotomy, larynx plugged from below with gauze.	In October 1898 (4 months) submaxillary glands were thought to be enlarging; both spaces cleared; no epithelioma of glands found (microsc.).	July 1901 (3 years)—works, eats, and sleeps well; no recurrence in throat or neck. 3½ stone gained since operation. Bad cough; sputum blood-stained yesterday.
3-inch cut on to upper end of left sternomastoid, glands and connective tissue along and outside vessels removed. Similar operation on right; only two glands near great cornu were enlarged. Right lingual tied. Pharynx opened by cut through origins of hyoglossus and middle constrictor up and back to great vessels; digastric tendon cut; right great cornu and bit of body of hyoid excised. Ulcer seen behind circumvallate papillae. Base of tongue and epiglottis in absolute contact with spine; growth extended down an inch below hyoid, overlapping glottis. Tongue cut across a finger's breadth in front of induration—more removed on right than on left; detached from hyoid with curved scissors kept close to the bone; raised from glottis and detached from thyroid cartilage by cutting epiglottis and mucosa; removed after division of mucosa and muscle attaching it to left great cornu. The transverse tongue-wound was in great part closed by six catgut stitches through tongue and mucosa above thyroid cartilage. Recovery easy. Fed by tube for 17 days. Swallowed quickly and well by 28th. At work two months after operation.	In March 1899 (9 months) bad recurrence in right lower carotid glands. Removed with lower half of jugular vein. The clearance extended well back into the right posterior triangle, the sternomastoid being divided below. In June 1900 (2 years) recurred deep to right sternomastoid about level of hyoid. Mass removed with superjacent piece of sternomastoid and glands and fat from posterior triangle. A firm nodule above mass was removed—the closed end of jugular. It and the mass were epitheliomatous.	August 2, 1902.—Last seen at hospital still complaining of bad cough; cause of cough not discovered. No recurrence in mouth or neck. After this date he did no more work. Dyspnœa and dysphagia developed, and there was slight blood-spitting. He died September 23, 1902, 4½ years from the first, 2½ from the last operation.

No.	Name. Sex.	Age.	Duration.	Condition on Admission.		
				General.	Local.	Glands.
17 1899, August.	Loft. M.	62	10 months sore.	Very thin. Temperature, 97°6-100; 101°8 just before operation. Pulse under 100. Respn. normal. Nil in chest. Good.	Infiltrating epithelioma of left half of tongue back to pillars of fauces and beyond midline. Left floor of mouth occupied by foul ulcer. Tongue fixed to jaw. Bled for 2½ hours after admission.	Hard left sub- maxillary mass, continuous with that in mouth. Large gland at left angle; another in right subclavian triangle. ?
18 1900, May.	McKellon. M.	62	8 months small sore, slow increase.		Ulcer on middle third of right dorsum, midway be- tween edge and mid-line. Infiltration moderate, mo- bility of tongue normal.	
— 1901, April.	—	—	5 months soreness. "Abscess" below right jaw a month later.	Poor.	A good deal of cancer in stump on right side. Sinus below right jaw, tissues much matted around; tongue nearly fixed, jaw not clearly felt.	3 or 4 large left submaxillary glands.
19 1900, June.	Nidd. M.	47	Tongue long tender. 2 years leuco- plakial patch (?) which slowly spread. 8 weeks ulcer and pain.	Thin	Ulcer, 1 in. by ½ in., markedly indurated, on left dorsum extending to right of mid-line; mo- bility good. Leucoplakial patches and fissures around.	Left submaxillary larger and harder than right. 2 soft upper carotid. Hard mass (pigeon's egg) attached to left sternomastoid and deep structures at cricoid level. Right submaxillary and upper carotid.
20 1900, Nov.	Young. F.	55	4 months white patch; glands, 2-3 weeks.	Thin; has lost flesh. No solid food 1 month.	Oval ulcer, 1 by ¾ in., on right dorsum two-thirds way back. Induration extends to mid-line, well on to posterior third, and forward along floor to frænum. Mucosa on jaw not affected. Tongue freely movable.	
21 1901, June 2	Stewart. M.	51	3 months probably. He then had epithelioma of free part of epiglottis on left of mid-line removed at Golden Square, and nodule in tongue was noted.	Delicate. Scarcely re- covered from previous operation. Wound was not healed on May 10.	Oval mass (=filbert in shell) reaching back to right anterior pillar and to near mid-line. No ulceration, only puckering of surface; no leucoplakia. Tongue not fixed; floor free.	Glands felt along both sterno- mastoids.
22 1901, July.	Compton, M.	52	13 months tender spot, attributed to sharp tooth.	Good; stout.	Large ulcer on posterior part of left tongue. Begins opposite 1st molar; end- ing cannot be seen. Ex- tends little on dorsum, &c. Covers side of tongue and sulcus, but not mucosa on jaw. Infiltration moderate.	One small left submaxillary; small, upper carotid; obscure subparotid mass.
1902, Jan.	—	53	7 months.	—	Ulcer on back of tongue- scar, on anterior pillar, soft palate, and floor of mouth.	No glands.
23 1902, Feb.	Ross. M.	52	18 months soreness in swallowing. 5 months lump in tongue.	Good; no loss of flesh.	Ulcer, size of a shilling, on left side of tongue, spread- ing on to anterior pillar and soft palate.	Subparotid and carotid down to thyroid cartilage.

Operation.	Recurrences.	Result.
By Kocher's incision and long cut on to sternomastoid, submaxillary region cleared (mouth growth exposed), subparotid mass removed, and many other glands lower in neck and running back into posterior triangle. Upper half of jugular removed. Lingual tied. Plug over exposed cancer.	—	Death, on 6th, of bronchitis and broncho-pneumonia, tongue not having been touched. He did fairly up to 5th; then chest-signs and heart-failure developed rapidly.
Right submaxillary and upper carotid region cleared (one submaxillary gland was epitheliomatous). Right lingual tied. Anterior two-thirds of right half of tongue removed, section passing to left of midline opposite ulcer.	Recurred in tongue in 6 months (November 1900). "Cheesy abscess" below right jaw a month later.	
None - - - - -	—	Inoperable recurrence 11 months after operation.
Left Kocher's cut, and another along sternomastoid to 1 in. above clavicle. Submental and submaxillary regions cleared. Subparotid and upper carotid glands and tissue removed; not obviously infected. The large mass was removed with adherent sternomastoid, sternothyroid, and piece of jugular. Below this other glands; one, as large as marble, burst. Anterior two-thirds of left tongue removed with scissors. Wounds sewn up; healed well.	Recurred; site unknown -	Died of recurrence not long after leaving hospital.
Submental (indurated) and right submaxillary glands removed; glands and connective tissue removed from vessels and behind vein from deep to digastric to cricoid. Right lingual tied. Mucosa elevated from jaw. Tongue divided down midline (on left of it opposite, ulcer) growth guarded, right half brought out into submaxillary wound and cut away near base. (Margin narrow behind and mesially.)	—	Death on 8th. Strength gradually failed after operation. Temperature subnormal, pulse rising. Wounds normal. Post-mortem.—Advanced interstitial nephritis. No enlarged glands found in neck.
Right Kocher's cut, submaxillary space cleared. Cut along sternomastoid: 2 of glands removed thought to be diseased. Lingual tied. Tongue drawn forward and anterior pillar cut. (Sudden cyanosis required tracheotomy.) Right half with tumour removed. Mouth-wound closed, except posteriorly, where it was impossible; cervical gauze-drained. Tracheotomy-tube removed on 2nd. Had to be fed by tube. Did not recover well. On 15th pleurisy; on 19th localised left basic empyema drained. Improvement, but still great weakness. Taken home on 32nd.	—	Died suddenly on 33rd, day after he went home.
Kocher's cut. Submaxillary region cleared. Two large glands deep to digastric removed. Cut along sternomastoid, and "small soft gland removed low down." Small nodule in superior constrictor removed. Left lingual tied. Mylohyoid incised; anterior pillar divided; left half tongue and floor of mouth where involved, drawn out through submaxillary wound and divided at base. (Satisfactory margin everywhere; upper carotid gland infected; lowest sound.)	Sore formed on back of tongue soon after discharge. See below.	—
Cheek reflected; jaw cut in front of ramus; growth in tongue, tonsil, soft palate, and parts of styloglossus, superior constrictor and internal pterygoid removed.	—	June 1902, died. Small nodule in tongue scar; glands on both sides of neck.
Kocher's cut, extended down along sternomastoid. Submaxillary space cleared. Glands and connective tissue removed from vessels from bifurcation of artery to mastoid process; also along spinal accessory to external jugular. Some soft glands burst in removal. A week later, lip and chin cut in midline, left cheek turned back. Jaw	In 8 weeks (end of May) swelling in still unhealed neck wound -- due to ruptured glands? Mouth healed; no recurrence.	Inoperable. Rapid growth. Death, November 1902.
margin; left half soft palate, left tonsil and anterior pillar, left half of hinder two-thirds of tongue removed. (Attack of acute mania during convalescence.)	Jaw sawn in front of ramus. Growth circumscribed with large	

No.	Name. Sex.	Age.	Duration.	Condition on Admission.		
				General.	Local.	Glands.
24 1902, May.	Parker, M.	68	5 months pain on swallowing and earache. 2 weeks submaxillary lump.	Fair. Some loss of flesh.	Ulcer on left edge of tongue, floor of mouth and mucosa of jaw, opposite second molar (on removal, growth ran half-inch into tongue and invaded alveolar process).	Submaxillary small. (Salivary and lymphatic glands removed were not infected.)
25 1902, June.	Gouter, M.	60	Occasional pain in swallowing 2 years. 5 months constant. 9 weeks trismus.	Good. 20 lbs. lost in 4 months.	Opens mouth half-inch between incisors; protrudes tongue half-inch, to right. Ulcer on right side of tongue opposite third molar, induration size of almond; right anterior pillar and soft palate to posterior edge involved: examination difficult.	No glands felt. (No infection found after removal.)
1903, Jan.	—	—	10 days swelling noted.	Good. Gaining weight.	Still small sinus from neck into mouth—large area of bare bone felt along it. Swelling just below cervical scar, $1\frac{1}{2}$ by $\frac{3}{4}$ in., adherent to deep structures.	—
26 1902, July	Adams, M.	55	2 months pain in eating. 4 weeks sore noted.	Thin, fair colour. Had lost weight.	Tongue almost fixed. Ulcer $1\frac{3}{4}$ by $\frac{3}{4}$ in. on left side, reaching to anterior pillar and on to floor; infiltrating deeply (microscopically: malignant type).	None felt. Submaxillary and upper sternomastoid regions full. (Glands in both regions infected.)
27 1902, Aug.	Rudd, M.	75	18 months sore opposite rough tooth. 3 months submaxillary lump. 3 weeks swelling above clavicle.	Healthy. Has lost flesh.	Ulcer on left tongue from midline to edge, and from half-inch behind tip to anterior pillar. (On removal reported to infiltrate tongue $\frac{1}{4}$ — $\frac{1}{2}$ in.)	Fulness in left submaxillary region and beneath upper end of sternomastoid. Tender, adherent 1 in. lump 2 in. above clavicle. (All reported infected on removal.)

FRÆNAL

28 1893.	Lamont, M.	58	6 months	Good	$1\frac{1}{2}$ in. ulcer destroying frænum and eating equally into tongue and floor. Mass felt beneath anterior third of tongue. Moved slightly on jaw. Gum not involved.	Submental and right and left submaxillary.
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Operation.	Recurrences.	Result.
Kocher's cut: submaxillary, subparotid and carotid region down to bifurcation cleared of glands and connective tissue; also outside vein beneath upper part of sternomastoid. Lingual tied. Cheek reflected from midline. Saw-cut in front of growth. Whole half of tongue, anterior pillar, adjacent floor, and 1 in. of body of jaw external to growth removed. A bridge of lower edge $\frac{1}{2}$ in. deep was saved and wired: it necrosed and caused much pain, and late suppuration.	—	March 1903 (10 months). No evidence of recurrence. General condition good. Still some bare bone about cut jaw and pain.
Kocher's cut: submaxillary, subparotid and upper carotid regions cleared: glands all small. Others along spinal accessory removed. Right cheek turned back from mid-line. Wedge of bone, base 1 in. just in front of angle, removed from jaw. Growth had extended along coronoid process and outer surface of maxilla. There were removed: right half of tongue to hyoid bone, right tonsil, both pillars, part of side wall of pharynx, more than half soft palate; mucosa over tuberosity of maxilla and coronoid process, anterior slip of temporal tendon and bone deep to involved mucosa; some internal pterygoid fibres. (Wide margin all round reported.) Easy recovery. Sequestrum separated after 3 months. Could separate teeth 1 in., and masticate well.	In January 1903 (6 months) in neck. See below.	—
Cut along sternomastoid: mass freed below and outside; adherent to vein which was tied, cut, and stripped up. Mass now found adherent to carotid above: stripped from artery, vein tied and removed. Its wall was infiltrated.	—	Recurrence in neck. Operation incomplete.
Kocher's cut: submaxillary region cleared. A few glands along external jugular removed. A few hard glands removed from along upper part of internal jugular and along eleventh nerve. Mouth and pharynx opened. Lingual artery tied. Lymphatic gland beneath hyoglossus removed. Tongue brought out below jaw and growth removed with $\frac{1}{2}$ to $\frac{3}{4}$ in. margin. Neck-wound gauze-drained.	—	Died of septic pneumonia in October 1902 (3 months). Two large stinking cavities in right lung. Tongue healed: no sign of growth. Neck-wound not healed. No infected glands noted.
Kocher's cut and submaxillary region cleared. A few small glands along external jugular removed. Cut along most of sternomastoid. Internal jugular tied and divided deep to digastric and turned down with adherent glands; sternomastoid cut half-inch above and half-inch below gland adherent to it; vein tied again below mass and removed with it. Lingual tied. Left half of tongue removed through mouth. Recovery easy.	In right cervical glands about 1 month before death—very rapid. Tongue remained free.	Died March 2, 1903. In November 1902 (3 months) he was in good health. He was comfortable, and took food well to 5 weeks before death.

CASES.

Right and left submaxillary salivary and lymphatic glands removed, also submental. 3 incisors drawn. Mucosa elevated from symphysis, ulcer cut away with $\frac{1}{2}$ inch margin towards tongue.	After 7 weeks in both anterior triangles. Right glands fixed, and, as then thought, inoperable.	Lost sight of with inoperable recurrence.
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No.	Name. Sex.	Age.	Duration.	Condition on Admission.		
				General.	Local.	Glands.
29 1893.	Smith. M.	54	?	?	Frænal ulcer extending to bicuspid on each side, not adherent to jaw but close to it.	?
—	—	—	—	—	Much induration in floor, extending into tongue.	Left submaxillary certainly.
—	—	—	—	—	Swelling behind centre of sternomastoid.	—
30 1894.	Searle. M.	72	9 months	?	Tongue very fixed: no ulceration visible. Hard. Not fixed to jaw. Notes very imperfect.	Masses in both submaxillary regions (glands were really small, pushed down by mass of tongue).
31 1896.	Rapson. M.	68	2 months special soreness beneath tongue and lump in neck. Frequent soreness since syphilis 40 years ago. Quite mild condiments brought water to his eyes. 5 years ago plantar psoriasis and probably leucoplakia lingualis.	Well nourished, ruddy, not looking his age.	Notes very imperfect. Ulcer, size of florin, destroying frænum, more on left than right, nearly reaching tip of tongue, involving alveolus on left.	Several submental in both submaxillary and both anterior triangles. On left, gland (pigeon's egg) adherent to parts around; on right, smaller, movable corresponding gland.
32 1897.	Hedgeland. M.	54	5 months. Much flesh lost. Daily bleeding last 14 days—"a lot" once. Lost a pint in two attacks after admission.	Thin, pale, and worn. U., P., and R. normal.	Floor involved in anterior two-thirds more on right than left. Deep ulcer extending from right edge of tongue across alveolus to outer sulcus from right lateral incisor to second molar. Tongue pushed to left and fixed on right. Swelling felt below right jaw and even across mid-line.	Right submaxillary fixed to growth. One left submaxillary felt. No carotid.
33 1899, Dec.	Giles. M.	50	6-7 weeks lump in tongue. Submaxillary glands 4 weeks.	Good.	Ulcer in floor from bicuspid to bicuspid, infiltrating tongue back to first left, second right molar. Dorsal mucosa normal; thin layer of soft tissue between it and growth. Jaw seemed free.	One right submaxillary.
1902, Oct.	—	56	5 months' swelling in mouth, 1 month lump in neck.	Good.	Tip of tongue sound; bound to floor. Ulcer, $\frac{3}{4}$ by $\frac{1}{2}$ in., extended from mid-line of floor to left; fixed to inner gum.	Opposite left thyroid space a $1\frac{1}{2}$ in. mass fixed to sternomastoid and deep structures.
34 1900, Nov.	Starke. M.	47	3 months mass under tongue.	Good.	Growth, size of a shilling, on frænum and floor of mouth slightly adherent to jaw. Tongue well protruded; floor not deeply infiltrated.	Submaxillary gland felt, as usual, on each side.

Operation.	Recurrences.	Result.
Mucosa elevated from jaw, ulcer cut out. A small right submaxillary operation done.	Recurred in 7 weeks, see next line.	
Removal of left submaxillary glands, jaw between bicuspid, floor of mouth and all induration in tongue. Two stout wire-spanners to represent jaw removed.	Recurred in glands behind one sternomastoid in 4 weeks. No note after fortieth day from first operation.	Then, mouth-wound closing fast, wires embedded. No falling in of chin.
3 or 4 almond-sized and several smaller glands removed; 1 wounded and clear fluid infected wound. Many apparently infected glands left along jugular.	—	Lost sight of, almost certainly with inoperable recurrence.
Several submaxillary glands removed with salivary glands on each side. Both linguals tied. Tongue removed through mouth — a mass of friable epithelioma.	—	Died on 5th. Hypostatic pneumonia. Stump of tongue "natural." No glands in neck.
Double "Kocher" with extension down along sternomastoids. Submaxillary and upper carotid regions satisfactorily cleared. Piece of left jugular removed with adherent softened gland which was wounded. Submaxillary wounds closed. Teeth drawn, infected alveolar edge cut away with anterior half of tongue and floor of mouth.	—	Death on 8th. Broncho-pneumonia. (Both submaxillary wounds suppurred; bronchitis: rising temperature.)
Double Kocher, carried further behind on right than on left. Both linguals tied. Lip and chin split and cheeks raised. Jaw sawn in front of right angle and through left second bicuspid, and removed with tongue and floor except mucosa of left floor and dorsum where not even overlapping hardness. Muscles cut in order at hyoid. Right coronoid process and mucosa over it removed.	—	Death unexpected on 11th. Mouth had been practically closed, and was almost healed. <i>Post mortem</i> Aortic incompetence. Pericardium generally adherent. Moderate interstitial nephritis (Dr. Wm. Hunter).
Double Kocher: removal of submental, submaxillary, and upper carotid glands on each side; latter seemed normal. Chin, lip, and jaw divided in mid line, floor of mouth back to bicuspid and anterior third of tongue cut away. Recovery easy; sinus over stitch in jaw.	In May 1902 (3 years 4 months from operation) recurrence in floor. See below.	—
Gland mass removed with 1½ in. of sternomastoid and 2 in. of jugular veins. Good margin everywhere. A week later mouth growth removed, partly through mouth, partly through submaxillary wound. Gum elevated from jaw, ½—¾ in. margin.	In December 1902 (2 months) induration noted at site of last mouth-growth, free from jaw.	Recurrence; operation declined.
Double Kocher incision; submental, submaxillary and upper carotid spaces cleared. Chin, lip, and jaw divided in mid-line, growth removed freely with scissors, jaw wired, muscles and lip sewn together, submental wound drained.	—	Remains well, March 1903 (2½ years).

One case (No. 2), a woman, remains well 11 years after operation. The growth and its treatment were of the simplest kind. An anterior, marginal ulcer of 10 weeks' duration was freely cut away. A small gland at the angle of the jaw was evidently regarded as having no connection with the growth and no gland-operation was done.

In two cases (Nos. 8 and 9), the patients have died of causes other than cancer, after 6 and $4\frac{1}{4}$ years respectively, being free from obvious cancer at the time. In No. 9, a feeble man of 75, the superficial growth of seven weeks' duration was removed freely, no gland-operation being done. In No. 8, again, the growth was recent and the tongue in no way fixed by a filbert-sized growth in the middle third: here a fairly extensive submaxillary operation was added to the removal of the growth.

Case No. 10 we regard as having been freed from a cancer on the right side of the tongue, and as having developed a second distinct cancer on the left side of his mouth. When first seen this man had a "considerable" ulcer on the right side of his tongue, not involving either the free edge or the floor, not crossing the mid-line and not impairing the mobility of the tongue. The mucosa between it and the frænum was red and irritable. The right submaxillary glands were infected. A free local operation was done, and three submental glands were found and removed together with all the submaxillary set. For $5\frac{1}{4}$ years this patient remained free. Then he returned with a superficial epithelioma of the left side of his tongue—quite separate from the scar of the former trouble (which was normal) extending to the floor and gum; the ulcer was one inch from before back. The left submaxillary glands were hard; the right neck was normal. A thorough clearance of the left submaxillary and upper carotid regions was effected; the lip and chin were split in the mid-line, a cheek-flap turned back, and the epithelioma, the infiltrated sublingual gland beneath it, and the piece of jaw subjacent to the affected gum, were removed. After nine months he had recurrence in the floor of the mouth and just behind the notch cut in the alveolar process. The lip and chin were divided through the old scar, the jaw sawn near the mid-line, the halves separated. The tongue was cut longitudinally, $\frac{1}{3}$ rd inch from

its left edge ($\frac{1}{2}$ inch from ulcer), the alveolar process chiselled off, and the ulcer in the floor completely removed with the tissues around and deep to it. It is over two years since this operation, and the patient writes, "I am in good health and my mouth is all right, so far as I know."

One other case (No. 24) is at present free from obvious cancer; but only 11 months have elapsed since operation. Besides the tongue, the floor of the mouth and the gum opposite the second lower molar were involved. A small submaxillary gland could be felt. The removal of the primary disease and its extensions seems to have been satisfactory; but in view of the five months' history it would have been safer to have extended the gland-operation down to the level of the cricoid cartilage at least. It is some comfort to know that the Registrar was unable to detect cancer in the glands removed.

We will refer next to two cases (Nos. 15 and 16) in which operation resulted in considerable periods of immunity. In No. 15 the disease seemed to be of the slightest kind. On the left edge, near the tip, was an oval patch about an inch in its long diameter, the posterior half of the patch being occupied by an early epitheliomatous ulcer. It was cut away with a surrounding ring of leucoplakia, and the left submaxillary and upper carotid regions were thoroughly cleared. The patient was anxious about himself, and attended frequently to be examined. After nearly two years it was thought that a slight swelling, which we had watched in the left submaxillary region, was enlarging; it proved to be a normal bit of the submaxillary salivary gland (deep part) left on the duct. After three years and eight months a leucoplakial patch near the tongue-scar, thick and tending to ulcerate, was freely removed. The epithelial layer was irregularly thickened, and its horny covering was in excess; deep to it the mucosa was richly infiltrated with round cells, but no invading epithelium was detected. Its removal could not, however, be regretted. A few months later a submental nodule (gland) was noted, which in four months reached a diameter of, perhaps, $\frac{1}{3}$ rd inch. It was then removed, and, again, no epithelium was found in it. Finally, $4\frac{3}{4}$ years after the removal of the small primary growth upon his tongue, a large very tender swelling, adherent

to the sternomastoid, formed rapidly just above the left clavicle, the rest of the neck seeming normal. It was hoped that the swelling might be inflammatory; but this was soon disproved, and an excision was carried out. Recurrence was immediate, a gland low down on the right side of the neck enlarged, strength failed rapidly, and he ceased to attend. On the 3-year limit, this case might have been counted as a cure!

The infection of the gland low down in the neck and the acute course of the disease in it are difficult to explain. Did the epithelial cells reach it by some unusual channels from the primary growth $4\frac{3}{4}$ years earlier, and lie dormant? Or was the leucoplakial patch, removed only one year earlier, really an epithelioma and the source of infection? One cannot help asking whether the submental gland also may have contained epithelium even though careful examination failed to reveal it. Could we answer these questions, we should at least understand how a cancer, apparently so trivial and so promptly removed, killed the patient.

We may contrast with this case another (No. 16) in which, although in some respects the worst in our list, we at one time hoped that we had succeeded in eradicating the disease. This man—alcoholic, but otherwise an excellent patient—had a cancer extending right across the true base of the tongue, absolutely out of sight, except with a laryngoscopic mirror. The tumour lay in contact with the spine in the mid-line, and breathing was apparently carried on through the lateral parts of the pharynx. It ceased entirely as anæsthesia became complete, necessitating tracheotomy. The growth extended from near the circumvallate papillæ to the epiglottis, which it infiltrated and perforated, there being an ulcer on its laryngeal aspect. It hung well down between the cornua of the hyoid bone and thyroid cartilage over the superior aperture of the glottis. Though the tongue-growth was larger upon the right than upon the left side, glands were more obvious beneath the left sternomastoid than in the right anterior triangle. Both regions were cleared, as described in the table, and the tongue-growth removed, together with the epiglottis, all but its point of attachment. There was thus nothing to prevent the discharges from the large transverse wound across the tongue from running straight into the larynx. We, therefore, think

that the almost complete closure of this wound, which was effected by purse-string sutures, must have been an important factor in warding off septic lung-complications; but the man's strength and wiriness, pluck and determination to get on, were most helpful. Recovery was practically uneventful. Ability to swallow ordinary food easily at the end of a month was more than we had ventured to hope for. Soon there seemed to be no need for special care to prevent food from going "the wrong way."

After four months an apparently unnecessary submaxillary operation was done; but in nine months he reappeared with a bad recurrence in the glands along the lower half of the right jugular vein, beginning just where the first operation ended, and extending well towards the clavicle. It was met by the removal of the lower half of the vein with a wide area of gland-bearing tissue. Not for $1\frac{1}{4}$ years was there any more trouble; but then a mass adherent to the sternomastoid formed in close relation to the upper cut end of the jugular vein. It was freely excised. Again, everything seemed satisfactory, and 13 months later he looked strong and well, had gained $3\frac{1}{2}$ stone since the first operation, and said of himself "I work, eat, and sleep well." But the reason of his visit was that for a fortnight he had had a bad cough, and the day before the sputum contained blood: no cause of cough and hæmoptysis was found, and as he always had chronic pharyngitis and a husky voice, we did not think seriously of it. He continued his work for more than a year, the cough persisting. At the end of this time, it seems, he had to give up work; dyspnœa and dysphagia supervened, and there was slight hæmoptysis. He died $4\frac{1}{4}$ years from the first and $2\frac{1}{4}$ years from the last operation—presumably of intrathoracic recurrence. His son wrote to us that "after death a lump showed just under the ribs on the right side." The first operation stopped the disease in the mouth and on the left side: had a little more been done *then* upon the right side, all might have been well. But it will be remembered by way of excuse that affection of glands on the right side was decidedly less obvious than upon the left.

One other point: At the first operation, the right hypoglossal nerve was preserved. To do this it was dissected

free for some two inches or more in a wound which was necessarily infected. When all had healed, one noticed on looking into the mouth only that the fauces were somewhat narrowed and that the right half of the tongue was wasted. The tongue could be well protruded, but went markedly to the right. Slowly this improved, until, two years after the first operation, it was noted that the tongue was symmetrical and was protruded in the mid-line. If a result such as this can be frequently attained, it would be worth while preserving the nerve for the sake of any muscle supplied by it which might properly be spared, *e.g.*, the genio-hyoid.

This is the small measure of success or partial success which we are able to report among our tongue-cases. The rest ended in death or early recurrence.

Deaths.—The mortality has been very heavy, 5 deaths (Nos. 12, 17, 20, 21, 26) having occurred in direct relation to the operation, though possibly not all from it. Thus it would seem likely that No. 17 was, at the time of operation, already suffering from broncho-pneumonia, though examination failed to detect it. The chief reason for operating upon so bad a case was that repeated serious hæmorrhage had occurred, and was most difficult to check. As it still seemed possible to remove the whole disease, this course was chosen. Owing to his weakness—attributed largely to loss of blood—the glands only were dealt with at the time that the lingual artery was secured; the mouth was not interfered with in any way, the tongue and involved jaw being left for a later occasion. In any case, the operation can have acted only as a general depressant.

With regard to No. 20, the cause of death some time ago would have been filled in unhesitatingly as “exhaustion.” Exactly what to substitute for it in this case is not clear; but she died because she was operated upon.

Nos. 12 and 26 were both bad cases, requiring grave operations—especially the former, in which a laryngotomy was performed, the pharynx being plugged and the tube retained to the day of death (5th). In 12 the cause of death seemed to be septicæmia; in 26 it was a long-drawn-out (three months) septic broncho-pneumonia.

The death of No. 21 is that most to be regretted, for the

growth was sufficiently recent and limited to justify the hope that it might be completely extirpated. Tracheotomy was necessitated, the tube being removed within 24 hours. The cause of death was an empyema which was drained; possibly his removal from hospital was a contributory cause.

This case was apparently an instance of the almost simultaneous development of two epitheliomata close to, but distinct from, one another. The man was sent to Charing Cross from the Throat Hospital, Golden Square, where he had his epiglottis removed by subhyoid pharyngotomy (with tracheotomy) for an epithelioma on the *left* side of its laryngeal aspect. At this time (three months ago) a nodule was noted on the *right* side of the dorsum of the tongue in front of the anterior pillar, and this developed into the filbert-sized, not ulcerated mass with which he was admitted. We have already expressed the belief that in No. 10 the growth, which appeared upon the left side of the tongue and mouth five years after the healing of the first operation-wound on the right side of the tongue, was a fresh development; and in this connection we may draw attention to case No. 7, in whom a rapidly-growing, infiltrating epitheliomatous ulcer developed in the left base of the tongue—away from the scar of the original right-sided operation, which remained sound—18 months after the removal of the first growth. Here, too, there is ground for suspecting that the later was not “secondary” to the earlier cancer. If our inference is correct, and the occurrence of three such cases in our table is not wholly exceptional, a “tendency” to cancer-growth in the mouth would be indicated, for which we were not prepared.

We have now dealt with 12 cases out of 26: 1 is alive and well (11 years); 2 died, 6 and $4\frac{1}{4}$ years after operation, free from obvious cancer; 2 are free from obvious cancer at the time of writing—one $8\frac{1}{4}$ years after removal of a cancer on the right tongue and more than 2 years from a second operation for a cancer upon the left side of the mouth; in the other, 11 months only have elapsed from the operation; in 2 cases life seemed to be considerably and usefully prolonged—4 and 5 years—but one (No. 15) is dying of certain recurrence in glands low in the neck, and the other (No. 16) most probably had some intrathoracic and possibly hepatic recurrence (died

in the country). 5 cases died; 4 soon after the operation—1 apparently from septicæmia, 1 from “exhaustion” (?), 1 from empyema, 1 from broncho-pneumonia. The 5th case died of broncho-pneumonia from a foul mouth after a gland operation only.

Recurrences.—In the 14 remaining cases the disease recurred quickly: in only 1 of them (No. 7) did a year elapse between the first operation and recurrence. Under this heading of recurrences, ultimately proving fatal, must of course be included cases Nos. 15 and 16, already dealt with, making a total of 16 cases in which the disease recurred and was not successfully dealt with.

FRÆNAL CASES.

In 7 cases, a cancerous ulcer affected the frænum and adjacent parts. Of these, 1 (No. 33) remained free for $3\frac{1}{4}$ years and then recurred; 1 (No. 34) is at present sound, 2 years and 4 months from the operation. 3 died (Nos. 30, 31, 32), 2 recurred—No. 28 in the anterior triangles, No. 29 *in loco* and in glands.

No. 34—the only case now free from cancer—was the least advanced of the series; but having the history of No. 33 before us, No. 34 can by no means be regarded as out of danger.

No. 33 had a considerable amount of local disease, though probably not quite so extensive as the statement under this heading would indicate; otherwise the operation done would have been obviously inadequate. Just when a believer in the 3-year limit would have been talking about a “cure,” a recurrence took place in what must have been scar-tissue. Unfortunately the man allowed 5 months to elapse before applying for treatment.

Both these cases were treated by the gland-operation (bi-lateral, of course), which we now regard as minimal, and then by median division of the lip, chin, and lower jaw, separation of the halves, and removal, under the eye, of the primary growth. This is certainly the most satisfactory method we have yet tried. Even after free extraction of teeth, access to the base of a frænal ulcer through the mouth is most unsatisfactory, and it is impossible to *see* what is being cut (Nos. 28,

29, and 30). Access is improved by removing the alveolar border (No. 31). We have never tried to approach the growth from below, as this would involve unnecessary injury to the digastric, mylohyoid, and geniohyoid muscles, with a considerable probability of infecting from the primary growth the cut ends of the muscles, past which it must be drawn with force capable of expressing much epithelium from the growth. After median division of the jaw, all is clear and the geniohyoids need not be interfered with, unless they come within the danger-zone.

When the symphysis seems to be seriously involved it is easy to raise cheek-flaps as far as may be necessary and to cut out the infected bone. This was done in 3 cases (Nos. 4, 29, and 32). In two instances (Nos. 4 and 29) an attempt was made to replace the chin by two arches of stout wire, the ends of which were inserted in holes drilled in the sawn surfaces of the mandible. The wires healed in in both cases, and the prominence of the chin was preserved. Unfortunately opportunity for observing was short (2 months and 40 days).

In cases 28, 29, and 30 (1893-4), the gland-operation was not nearly free enough, and the immediate result in 28 and 29 proved it.

With regard to the 3 deaths, No. 31 was the only one due to a cause special to mouth-operations. The hypostatic pneumonia in No. 3 showed no signs of septic infection. It would probably have been wiser not to have operated upon so bad a case at the age of 72. No. 31 was a great disappointment. The operation had been very extensive; the bit of mucosa saved on the left side had been used to cover the raw surfaces of the submaxillary flaps, and healing had gone on most satisfactorily, when he unexpectedly died—apparently from aortic disease.

SUMMARY.

We now find that, eliminating case No. 1, for reasons given, we have 33 cases, about which the following general remarks may be made. There were 3 women and 30 men. The youngest patient was 42, the oldest 75. The great majority of cases (19) occurred between 50-59 years of age; 5 between 40-49; 6 between 60-69; 3 between 70-75. As to site, in

the 26 tongue cases, 6 were anterior; 12 lay in the molar region, in front of the anterior pillar; 6 occupied more or less of this region and of the anterior third; 1 stretched back into the posterior third; only 1 occupied the posterior third.

Adding together our two previous summaries we find that of 33 primary cases (26 tongue, 7 frænal):—

1 is free from cancer after 11 years;

1 is free from one cancer after $8\frac{1}{4}$ years, and from another after $2\frac{1}{4}$ years;

2 died free from cancer after 6 years and $4\frac{1}{4}$ years;

1 (frænal) is free after $2\frac{1}{4}$ years;

1 is free after 11 months.

1 recurred in a low gland after $4\frac{3}{4}$ years;

1 recurred *in loco* (frænal) after $3\frac{1}{4}$ years;

1 recurred twice in glands during the first 2 years, and these remained free from local or cervical recurrence till death at $4\frac{1}{4}$ years;

16 others recurred within a year;

8 died.

The main questions, under which lie several others, are:—

1. Could not recurrence have been more frequently prevented? and, 2. Could not the immediate mortality be reduced?

1. Some "recurrences" may really be fresh growths. This would seem most probable when they occupy positions separated by an interval from the first growth, not in the line between it and the nearest glands, and not parts of the original operation-wound, which might have been directly inoculated from the primary growth. The time-relation is less important: true secondary recurrences may appear very late. These "recurrences" cannot be prevented.

We have had reason to think, though it is difficult to prove, that some recurrences have been due to direct inoculation of raw surfaces from the growth as it is dragged past them, and we have endeavoured to keep the growth wrapped in a "guard." This is not satisfactory: and we propose in future to try wiping over the surface of the growth with the cautery before beginning the operation. Similar infection of surfaces undoubtedly takes place from wounded or burst, softened

secondary glands—an accident which it is not always easy to avoid, though every care to do so should be exercised (Nos. 12, 15, 19, 23). The escaped contents of such a gland should be at once wiped up, soiled instruments should be sterilized, soiled hands cleaned; probably we cannot do better than follow Cheyne's advice and paint the soiled surface with pure phenol.

But the great majority of recurrences are due, *in loco*, to the removal of an insufficiently wide margin of apparently healthy tissue round about the primary growth; or, in glands, to a too limited operation upon the gland-area in connection with that growth. More extensive operations would, doubtless, have diminished these recurrences.

Of the 19 cases which recurred, we failed in 2 (Nos. 3 and 19) to ascertain the site. We know that 8 (Nos. 4, 5, 6, 11, 18, 21, 29, and 33) recurred *in loco*. In our operations a margin of at least half an inch has been aimed at, but not always obtained even when it might have been: we have not infrequently allowed the desire to diminish the mutilation—to preserve some clearness of speech, some sense of taste, some power of voluntary deglutition—to weigh unduly against the paramount object of the operation. In particular, respect for "the middle line" has been too great. A disease so difficult to arrest as this is, certainly justifies the freest treatment. Every one holds this: the difficulty is the practical one of ascertaining the limits of the growth. Touch in the deeper parts of the tongue is not a sufficient guide, and one cannot see—indeed, one does not want to see—the growth. If the tongue and its surroundings had no more importance than, and were structurally similar to, the breast, the problem would be solved: there would be no hesitation in making a clean sweep of the whole organ. But there is a septum down the middle of it, and we know as a matter of experience that the sacrifice of one half or even less is often sufficient to prevent local recurrence: consequently, we do hesitate to remove the whole organ.

It is not until we get well back into the molar region that these difficulties are serious. We endeavour to meet them by providing better access than can be obtained through the mouth, so that touch and sight can be used more effectively.

To this end we have most commonly employed Langenbeck's section of the jaw in front of the ramus, with wide separation of the two parts. Several times a wedge of bone (Esmarch) has been excised when cicatricial closure of the jaws has seemed likely: necrosis has been very common. When the jaw has been involved the part has been removed (with or without breaking the arch), and access to the soft parts has been obtained. Kocher's submaxillary operation has not always answered our expectations—perhaps because the faucial pillars have not been divided sufficiently freely to allow the base of the tongue to come well out. But this, we understand, has now been abandoned by Kocher himself in favour of median section of chin, jaw, and tongue back to the hyoid, which he considers gives still better access. For cancers towards the back of the tongue we have not tried it; but it is certainly the most satisfactory method of dealing with frænal cancers and others involving the anterior part of the floor (Nos. 10, 33, 34). With one or other of these aids we endeavour to remove the growth in a capsule of apparently healthy tissue which is nowhere less than half an inch, and which is double this, if possible, behind and beneath the growth. Section of the muscles above the hyoid bone is the most certain way of obtaining this. There is probably most danger of recurrence in these two directions.

One other point with regard to the local operation. Although there does seem to be a marked difference between squamous and spheroidal epithelial cells in their tendency to stick in the lymphatics between the growth and the glands, this does happen occasionally with squamous epithelium. Thus a small nodule, apparently cancerous, was removed from the superior constrictor in No. 22; and we think that in No. 13 the recurrences in the right submaxillary region were probably due to similar deposits. As the lymphatics from the anterior part of the tongue and floor are said to pass through the mylo-hyoid on their way to the submaxillary glands, a careful examination, at least, of this muscle should be made in cancer of these parts; and removal of it and the anterior belly of the digastric would be advisable in advanced cases.

With regard to the gland-operation, it has always been our teaching and practice that the nearest glands should be

removed ; and, with three exceptions, this has been carried out. The exceptions were No. 2 (1892), No. 9 (aged 75, 1895)—curiously, two out of the few cases in which there was no recurrence—and No. 14 (1897). Unless this man declined to allow a gland-operation to be done, we cannot account for its omission. The result was disastrous, as reference to the table will show. We feel, then, that cases in which it may be justifiable to omit a gland-operation must be very exceptional. The question of the extent to which these operations should be carried is still a matter of opinion. The cases recorded will show that it has been steadily extended. Beginning with submaxillary incisions which ended below the angle of the jaw, the incision recommended by Kocher (1893) was adopted in 1894 (Case No. 6), and was soon used in all cases, on one or both sides. In 1896 incisions downwards along the anterior edges of the sternomastoids were added (in a frænal case) and have been used since whenever it seemed desirable to remove glands below the carotid bifurcation. As in operations on the primary growth, so in those upon glands, success has often seemed to be just missed. Thus in Nos. 7 and 11 (growth opposite molars), the operation was practically limited to the submaxillary glands and recurrence took place in the subparotid and upper deep cervical. In No. 4, the growth being anterior, deeply infiltrating, and on both sides of mid-line, clearance of the submental and submaxillary regions on both sides was followed by swelling of upper deep cervical glands on both sides ; whilst in No. 13, a similar but less extensive case, removal of the submental, both submaxillary and both deep cervical glands by Kocher's incisions resulted in recurrence in deep cervical glands below the level of the hyoid. We therefore think that in early cases, whether in the anterior or middle third, the submaxillary glands and all glands beneath the sternomastoid, parotid and posterior belly of the digastric down to the bifurcation of the carotid and backwards as far as can be reached along the 11th nerve, should be removed, together with as much connective tissue as can be taken with them. If the history shows that an epithelioma has existed for more than two months, especially in the middle and posterior third, it will be wise to add an incision along the anterior edge of the sternomastoid to the clavicle and to

remove the deep cervical glands as far as can be done without dividing muscles. There is a deep cervical gland behind the jugular vein about the level of the cricoid which seems liable to infection even before those higher up. We find a special note of it in No. 12 (growth opposite tonsil; 3 months pain), No. 19 (middle third, 2 years spreading leucoplakia, 2 months ulcer and pain), and No. 27 (growth in anterior and middle thirds, 18 months sore).

If the mid-line of tongue or floor is crossed by a growth, a gland-operation should be done upon both sides (Nos. 4, 13, 16). So also in most, if not all, cancers of the posterior third.

If a gland is adherent to muscle, a good piece of muscle should be removed with it: it is wholly unsafe to dissect the gland off. Similarly, where a gland is closely adherent to a vein (*e.g.*, jugular) a sufficient length of the vein should be removed. It is sometimes possible to separate the gland, leaving the vein apparently quite clean: it is almost certainly epitheliomatous (*see* No. 13). When, as is much more rarely the case, the carotids are similarly involved, either a piece must be cut out (No. 7)—a course by no means free from dangers—or complete removal must be given up (No. 25). In no case was the vagus involved.

The remarks as to the proper extent of the gland-operation are still only tentative. It would be a great help to have a "set" gland-operation as we have in the case of the breast, capable of extension under special circumstances. But the lymph-streams from the tongue evidently pursue a much less regular course than do those from the breast, *i.e.*, an operation calculated for the average tongue-case will cover a far smaller number of cases. Nevertheless we feel confident that there would have been fewer recurrences in glands had the above suggestions been followed.

2. As to the heavy mortality, we have already said (p. 18), whilst the cases were fresh in mind, what we feel we may in explanation of it.

With regard to its diminution, care in selecting suitable cases is the first requisite. On first reading over the cases, we felt that perhaps we ought to have refused to operate upon Nos. 30 and 32; but that was chiefly because they died

We should not decline to operate upon a man with a bad cancer because he was 72, or because he had aortic disease. No. 17 ought certainly not to have been operated upon.

Having selected a suitable case, the following is the general plan of treatment. The teeth are scaled, and cavities and stumps are seen to (Cheyne). Much time is spent in washing out the mouth with boric lotion. The chief and, we think, best anæsthetic throughout is chloroform; but sometimes ether is given during the gland-operation. A little ($\frac{1}{4}$ gr.) morphia, 15 minutes before starting, has several times acted well. The mouth is cleansed and the surface of the growth cauterised. The gland-operation is first carried out and the wound is closed, if it is certain that the tongue-wound will not open into it: if there is any doubt about this, it is left open. In either case it is "guarded." Then the growth in the mouth is removed. The head is generally turned towards the same side as the disease; but sometimes, especially when the jaw is sawn, towards the opposite side. In either case, the dependent side of the nasopharynx and cheek are arranged so as to form a "well" for blood below the level of the glottis: with this position it is rare to hear the slightest rattle. A head-light or hand search-light is used. Tracheotomy is performed only for dyspnoea. If the jaw is to be divided anywhere the lip and chin are always divided in the mid-line, and the cheek and Kocher's submaxillary flap are raised to the proper extent. The paralysis of the lower lip which resulted from Langenbeck's cut down from the angle of the mouth is thus avoided. After the removal of the growth, every endeavour is made to cover over the raw surface in the mouth with mucous membrane, and to leave a mobile tip to any tongue that remains. Extensive early healing may thus often be brought about; and discharge into the mouth is proportionately diminished. If the wounds in the mouth and neck communicate or even come close to one another, the latter is freely drained with a gauze plug. The mouth-wound is painted with Whitehead's varnish. Until the patient has recovered consciousness and any shock has passed off, he is kept lying on the sound side, with the angle of the mouth low, and is well looked after by a nurse. After a few hours he is set upright against a bed-rest, and remains in this position; fluids

tend to run out of the mouth, the patient is more easily assisted to get rid of mucus; he breathes, spits, and coughs more effectively. His mouth is frequently cleaned with "dabs" moistened with soda-solution. Twice a day mouth, teeth, and tongue are carefully gone over, and after one of these cleanings Whitehead's varnish is applied to the dried surface. The patient rinses his mouth frequently, and always before and after food. He is fed at first by the rectum, and, if necessary, by stomach-tube; these means of feeding are abandoned as he becomes able to swallow. Little or no stimulant is required.

The shock resulting from prolonged operations upon the neck and tongue is surprisingly slight, although a good deal of blood is sometimes lost. Consequently the cases detailed have, with one or two exceptions, had both growth and glands removed at one operation, and we feel that with average patients more may be done than has been done. It may be that the deaths from hypostatic pneumonia and exhaustion—possibly even some others—would have been avoided by operation *à deux temps*; it is not to be wholly put aside. The advantage to the patient of one operation instead of two is obvious; but there seems to be another which is not so clear. The effect of removing the mouth-growth and waiting for 1 to 3 weeks is to send a greatly increased lymph-flow through the infected glands and to give them time to profit by it. Surely, this must diffuse their contained epithelium more widely. It will be noted that when the operation in two stages has been adopted, the opposite course has been followed—the gland-operation has been done first and the lingual secured. This has the effect, it is true, of turning the lymph-stream along some abnormal path; but it is diminished, not increased. Further, if after a week the removal of the tongue leads to a communication with the neck, healing is advanced and trouble much less probable than under the opposite circumstances, viz., an old oral and a recent cervical wound.

